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EXAMINER	
ENIN-OKUT, EDU E	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/560,434	SU, QINGQUAN	
	Examiner	Art Unit	
	Edu E. Enin-Okut	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FUEL CELL COGENERATION SYSTEM

Detailed Action

1. The amendments filed on February 27, 2009 were received. Applicant has amended claims 1 and 2. Currently, claims 1-5 are pending.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

3. The objection to the specification is withdrawn because amendments were made to the abstract.

Claim Rejections - 35 USC § 103

4. The rejections of claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buswell (US 5,360,679) in view of Chen et al. (US 5,985,474) is withdrawn because claims 1 and 2 were amended.

5. Claims 1, 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyauchi et al. (US 2003/0162065) in view of Buswell et al. (US 5,360,679), Miyauchi et al. (WO 01/37361; refer to US 7,147,951 as an English translation), and Bartas (US 3,539,395).

Regarding claims 1 and 2, Miyauchi teaches a fuel cell cogeneration system (para. 3, 77; Figs. 1-5, 9), including:

- a reforming device (fuel treater 2 with a reformer 3) for reforming raw material fuel to generate reformate (fuel gas) (para. 3, 77);

- an oxidant gas humidifying device (air-side humidifier 7) for taking in recovered water (condensed water) recovered from the reformate and oxidant gas, humidifying the oxidant gas with the recovered water, and discharging the oxidant gas (para. 20, 21, 78, 83, 88, 91);
- a fuel cell (fuel cell 1) for generating electricity through an electrochemical reaction between the generated reformate and the discharged oxidant gas (para. 3, 4, 19);
- a hot water storage device (hot-water storage tank 13) for storing hot water and recovered heat recovered by the hot water via a heat exchanger (heat exchanger 10) from cooling water supplied to the fuel cell to be used to cool the fuel cell and discharged from the fuel cell (para. 3, 4, 23, 24, 25); and
- wherein the hot water is circulated (via circulation pump 11) through the hot water storage device (hot-water storage tank 13) and the heat exchanger (heat exchange means 10) (para. 3, 4, 80, 82, 97);
- wherein the hot water (hot-water storage tank 13), the cooling water (circulating about cooling pipe 8 via pump 9), and the recovered water (stored in condensed-water tank 16) are isolated from each other (Figs. 1-5), and
- a control device (control means 19) (para. 95).

Further, Miyauchi also teaches that the hot water storage device (hot-water storage tank 13) is separate from the oxidant humidifying device (air-side humidifier 7) (Figs. 1-5, 9).

Miyauchi does not expressly teach a thermometer for measuring a temperature of the hot water storage device; or, that the reforming device takes and combusts anode off gas to generate combusted gas; or, that the control means receives a signal from the thermometer and performs as recited in the claims; or, a heat exchanger into which recovered water is introduced.

As to a thermometer and the control device receiving a signal from it, Miyauchi does teach that a temperature detection means 20 detects the temperature of a heat transport medium, i.e. water from the

hot-water storage tank 13, at the exit of an exhaust heat recovery pipe 12 connected to a heat exchange means 10 so as to output the exhaust heat recovery temperature for the hot-water storage tank 13 to a control means 19 (para. 34, 39, 95, 99; Figs. 2, 4, 5). Although Miyauchi does not expressly teach the use of a thermometer as the temperature detection means described above, it would have been obvious to one of ordinary skill in the art to use a thermometer in the cogeneration system of Miyauchi, and for the thermometer to communicate with its control device via a signal, because the use of thermometers as temperature-sensing elements is well-known in the art.

As to the reforming device taking and combusting anode off has to generate combusted gas, it should be noted that the limitation has been considered, and construed as a functional limitation that adds no additional structure to the fuel cell cogeneration system. See MPEP 2114. However, Buswell teaches a fuel cell electric power generation system with a fuel processing subsystem using a reformer (Abstract; 4:50-54, 4:57-59). The reformer includes a reformer burner fed by at least one reactant exhaust stream for the electric power generation system, a fuel cell stack (4:59-65). Thus, it would have been obvious to include a burner in the reformer used in cogeneration system of Miyauchi that takes in and combusts anode off gas because Buswell teaches that system integration, such as the recycle and use of exhaust gas rather than introduction of an external combustible energy source, improves the efficiency of the system (Abstract).

As to the control device performing control as recited in claim 1 (i.e., use of discharged cooling water as a heat source for the oxidant humidifying device when the hot water storage device is higher than a predetermined value), and a heat exchanger into which recovered water into which recovered water is introduced, Miyauchi et al. (WO 01/37361; hereinafter referred to as Miyauchi '361) teaches a cogeneration apparatus including a fuel cell 1; a fuel processor 2 with a reformer 3; fuel and oxidation side humidifiers 5,7; an internal heat transport medium (water) circulated through a cooling pipe 8 to cool the fuel cell 1; and, an external heat transport medium (water from hot water tank 39) exchanging heat

with the internal heat transport medium via a first heat exchanging means 14 (Abstract; 4:50-5:20, 5:30-6:9, 12:55-58; Figs. 1, 3, 4). When there is no need to collect waste heat of the cogeneration apparatus through the hot water tank 39, the internal heat transport medium is routed (via closing a valve 16 and opening a valve 15) to a radiator 10 to exchange heat with external air in order to dissipate heat generation in the fuel cell 1 (5:65-6:9, 10:5-13). One of ordinary skill in the art would appreciate that there would be no need to collect heat through the hot water tank 39 of Miyauchi '361 when the temperature of the hot water is such that appreciable heat transfer with the cooling water is not possible.

It would have been obvious to one of ordinary skill in the art at time of the invention to include another heat exchanger into the cogeneration system of Miyauchi, as modified by Buswell, because Miyauchi '361 teaches that the additional heat exchanger provides a means with which to dissipate heat from cooling water discharged from a fuel cell when a first heat exchange medium, such as water from its hot water storage device, is at a temperature where adequate heat transfer is no longer possible.

Further, Bartas teaches a fuel cell with its air being delivered from an air supply means to an oxidant chamber means (Abstract; 4:1-2). For this purpose, incoming air supplied by an air duct 61 is transferred from a heat exchanger 63 (which at least partially equilibrates the incoming air temperature to that of the fuel cell) to a humidifier 67 by a duct 65 (4:2-6, 4:27-30). After being warmed in the heat exchanger, the incoming air stream is transported to the humidifier to assure a high order of humidity before introduction into the oxidant chamber means (4:12-15). In addition, Miyauchi teaches that condensed water stored in condensed-water tank 16 is supplied to its air-side humidifier 7 (para. 78; Fig. 1-5).

Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to use the additional heat exchanger in the cogeneration system of Miyauchi, as modified by Buswell and Miyauchi '361, to heat recovered water with cooling water discharged from its fuel cell prior to supplying the recovered water to its oxidant gas humidifying device because Bartas teaches that its use can

equilibrate the temperature of media entering the humidifier, such as the recovered water, with that of the fuel cell and, in turn, minimize thermal stresses while ensuring a high order of humidification (see Bartas, 4:27-32).

As to the control device performing control as recited in claim 1 (i.e., use of heated gases as a heat source for the oxidant gas humidifying device when the temperature of the hot water storage device is lower than a predetermined value), Bartas also teaches the use of exhaust gases from its fuel cell in the heat exchanger 63 to warm the air subsequently supplied to the humidifier 67 (4:1-15).

Although Miyauchi, Buswell, Miyauchi '361 and Bartas do not expressly teach that the control device uses heated gases as a heat source for the oxidant gas humidifying device *when the temperature of the hot water storage device is lower than a predetermined value* (emphasis added), it would have been obvious to one of ordinary skill in the art at the time of the invention to employ an alternative heating source in the additional heat exchanger used in the cogeneration system of Miyauchi, as modified Buswell, Miyauchi '361, and Bartas, when cooling water discharged from its fuel cell is not available for this task as discussed above (i.e., when the water from its hot water storage device is at a temperature where adequate heat transfer with the cooling water is still possible) because Bartas teaches that its use is a means with which to heat an oxidant gas prior to introduction into a humidifier.

Regarding claim 4, Miyauchi '361 teaches that the flow rate of its external circulation pump 31 that exchanges heat of water of the hot water tank 39 (through the waste heat collecting pipes 17a and 17b) is controlled based on the detected value of the hot water thermistor 32 (9:54-57; Figs. 3, 4). As discussed above, Miyauchi '361 also teaches that, when there is no need to collect waste heat of the cogeneration apparatus through the hot water tank 39, in order to dissipate heat generated in the fuel cell 1, the flow rate adjustment valve 15 is left open, the flow rate adjustment valve 16 is closed and the radiator unit 10 is activated, thus making it possible to exchange heat of the internal heat transport medium with external air (10:5-13; Figs. 3, 4).

Although Miyauchi, Buswell, Miyauchi '361 and Bartas do not expressly teach that the control device controls the cooling water flow setting device, it would have been obvious to one of ordinary skill in the art for the control device to do so in response to the temperature of the hot water storage device because Miyauchi '361 teaches that these valves are actuated when water from hot water storage device is at a temperature where adequate heat transfer is no longer possible.

6. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyauchi, Buswell, Miyauchi '361 and Bartas as applied to claims 1, 2 and 4, and further in view of Katagiri et al. (US 2001/0010875).

Miyauchi, Buswell, Miyauchi '361 and Bartas are applied and incorporated herein for the reasons above.

Regarding claim 3, Miyauchi, Buswell, Miyauchi '361 and Bartas do not expressly teach a heated gas flow setting device for setting a flow of the heated gas to be introduced into the heat exchanging device; and, that the control device controls the setting of the heated gas flow setting device.

Katagiri teaches a humidification system for a fuel cell (Abstract) where the amount of exhaust gas from a fuel cell 1 introduced into a humidifier 6 is regulated by a flow regulating valve 22 in order to control the amount of humidification of reaction gas supplied to the cell (para. 57, 58; Fig. 4). The flow regulating valve 22 is connected to a controller 23 (para. 45).

It would have been obvious to one of ordinary skill in the art at the time of the invention to include a heated gas flow setting device to set the flow of heated gas into the additional heat exchanger used in the cogeneration system of Miyauchi, as modified by Buswell, Miyauchi '361 and Bartas, prior to introduction into its humidifier, with the control device controlling the heated gas flow setting device, because Katagiri teaches their use can regulate the flow of the heated gas and participate in the control the amount of humidification of reaction gas supplied to its fuel cell.

Although Miyauchi, Buswell, Miyauchi '361 and Bartas do not expressly teach that the control device controls the heated gas flow setting device to set the heated gas flow into the heat exchanging device when the temperature is lower, or higher, than the predetermined value, it would have been obvious to one of ordinary skill in the art at the time of the invention to control the introduction of the heated gas via the heated gas flow setting device used in the cogeneration system of Miyauchi, as modified Buswell, Miyauchi '361, Bartas and Katagiri, to correspond with the unavailability of cooling water discharged from its fuel cell as a heat source for the additional heat exchanger as discussed above (i.e., when the water from its hot water storage device is at a temperature where adequate heat transfer with the cooling water is still possible).

Regarding claim 5, the limitations recited in this claim have been addressed above with respect to claim 4.

Response to Arguments

7. Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action

is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence / Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Edu E. Enin-Okut** whose telephone number is **571-270-3075.** The examiner can normally be reached on Monday - Thursday, 7 a.m. - 3 p.m. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E Enin-Okut/
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
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